
PROPOSED REGULATIONS

For information concerning Proposed Regulations, see Information Page.

Symbol Key

Roman type indicates existing text of regulations. *Italic type* indicates proposed new text.
Language which has been stricken indicates proposed text for deletion.

VIRGINIA WASTE MANAGEMENT BOARD

Title of Regulations: 9 VAC 20-160. Voluntary Remediation Regulations (amending 9VAC 20-160-10 through 9VAC 20-160-40 and 9VAC 20-160-60 through 9VAC 20-160-120; repealing 9 VAC 20-160-50 and 9 VAC 20-160-130).

Statutory Authority: § 10.1-1429.1 of the Code of Virginia.

Public Hearing Dates: November 26, 2001 - 1 p.m.
November 27, 2001 - 1 p.m.
November 29, 2001 - 10:30 a.m.

Public comments may be submitted until 5 p.m. on December 27, 2001.

(See Calendar of Events section for additional information)

Agency Contact: Melissa Porterfield, Department of Environmental Quality, P.O. Box 10009, Richmond, VA 23240, telephone (804) 698-4238 or e-mail: mspporterfi@deq.state.va.us.

Basis: Section 10.1-1429.1 of the Code of Virginia directs the Virginia Waste Management Board (board) to promulgate regulations that facilitate voluntary cleanup of contaminated sites where remediation is not clearly mandated by CERCLA, RCRA, the Virginia Waste Management Act, State Water Control Law or other applicable authority. Section 10.1-1402(11) of the Code of Virginia authorizes the board to promulgate and enforce regulations necessary to carry out its powers and duties, the intent of the Virginia Waste Management Act and the federal acts. There is no corresponding federal mandate since the regulations apply only where remediation is not otherwise required under state or federal law, or where such jurisdiction has been waived.

Purpose: The proposed regulations are necessary to update documents incorporated by reference, and to clarify the regulations. Test methods and risk assessment guidance documents referenced in the proposed regulations have been reviewed to ensure that the most recent versions of the documents are referenced. By referencing the most recent versions of these documents, the regulations ensure that human health and the welfare of citizens are being protected.

The goals of the proposed regulations are to clarify the regulations and to make the regulations easier to understand. The remediation level section has been re-organized to clarify the Tier I, Tier II and Tier III standards for remediation. Also, the regulations have been reviewed to assure that terminology used in the regulations is consistent. Throughout the proposed regulations, the term "remedial action" has been replaced with the term "remediation" and the term "remediation cost estimate" has been replaced with the term "cost of remediation."

Substance: The regulations now clarify that land use controls approved for use at the site are considered remediation.

9 VAC 20-160-10. Definitions. This section has been amended to include additional definitions to clarify the regulations. The definition for "agreement" has been removed since agreements are no longer established between participants in the program and the department. Definitions for "certificate," "land use controls," and "report" have been added. Definitions for "cost of remediation," "engineering controls," "institutional controls," "owner," "remediation level," and "termination" have been modified. The definition of "upper-bound lifetime cancer risk level" has been removed, and a definition for "incremental upper-bound lifetime cancer risk level" has been added.

9 VAC 20-160-40. Application for participation. The timeframe for departmental review has been changed from 45 working days to 60 days. This change gives the regulations a consistent timeframe for applications to be reviewed. In the past, the regulated community has been confused with the term working days. By converting to calendar days, the timeframe is clarified. The department is proposing 60 days since 45 working days is approximately 60 calendar days.

9 VAC 20-160-50. Agreement. This section has been repealed. This section is no longer relevant to the regulations since the timeframe for electing to remain under an agreement to perform voluntary remediation of a release has passed.

9 VAC 20-160-60. Registration fee. This section has been revised to consistently use terminology defined in 9VAC 20-160-10.

9 VAC 20-160-70. Work to be performed. This section has been changed to clarify the necessary components of the Voluntary Remediation Report. The section now describes the five elements of the report and the information to be included in each element. By revising this section to include more detail, the department anticipates participants will be able to submit complete reports that will minimize delays in obtaining a certificate. Also, the reference to Test Methods for Evaluating Solid Waste has been updated to incorporate the most recent test methods.

9 VAC 20-160-80. Review of submittals. The reference to working days has been deleted from this section. If appropriate, the director shall, within 120 days of a complete submittal, expedite issuance of such permits required to initiate and complete a voluntary remediation.

9 VAC 20-160-90. Remediation levels. This section has been re-organized to aid program participants in understanding the remediation levels. Additionally, the regulations clarify that land use controls approved by the department for use at the site are considered remediation.

9 VAC 20-160-100. Termination. The meaning of the term termination has been revised. Termination now means the discontinuation of participation in the program prior to

receiving a certification of satisfactory completion of remediation.

9 VAC 20-160-110. Certification of satisfactory completion of remediation. Additional language has been added to this section that states that the site has and will continue to attain remediation levels. Participants must also demonstrate that migration of contamination has stabilized. This section also requires the certificate to contain information on land use controls on surrounding properties that were taken into account when the certificate was issued. Language now contained in the certificate that the department issues has been included in the regulations.

9 VAC 20-160-120. Public participation. The section has been re-titled "Public notice." Program participants are now required to acknowledge any comments received during the public comment period and also provide copies of any responses made to comments.

9 VAC 20-160-130. Regulatory evaluation. This section is obsolete and has been removed. The periodic review of these regulations is now required under Executive Order Twenty-Five (98) and will be performed as required under the executive order.

Documents incorporated by reference have been updated to reference the most recent versions.

Issues: The general public, localities and Commonwealth will benefit from the remediation of contaminated sites and the economic benefits of returning a site to productive use. There are no disadvantages to the general public, local governments or the Commonwealth.

All participants in the Voluntary Remediation Program benefit from the clarifications contained in the proposed regulations. The clarifications should eliminate confusion concerning the requirements associated with receiving a certificate of satisfactory completion.

Locality Particularly Affected: No locality would be particularly affected by the proposed regulations.

Public Participation: In addition to any other comments, the board is seeking comments on the costs and benefits of the proposal and the impacts of the regulations on farm or forest lands.

Anyone wishing to submit written comments for the public comment file may do so at the public hearing or by mail. Written comments should be signed by the commenter and include the name and address of the commenter. Comments must be received by the close of the comment period. Oral comments may be submitted at the public hearing.

Department of Planning and Budget's Economic Impact Analysis: The Department of Planning and Budget (DPB) has analyzed the economic impact of this proposed regulation in accordance with § 2.2-4007 G of the Administrative Process Act and Executive Order Number 25 (98). Section 2.2-4007 G requires that such economic impact analyses include, but need not be limited to, the projected number of businesses or other entities to whom the regulation would apply, the identity of any localities and types of businesses or other entities particularly affected, the projected number of persons and

employment positions to be affected, the projected costs to affected businesses or entities to implement or comply with the regulation, and the impact on the use and value of private property. The analysis presented below represents DPB's best estimate of these economic impacts.

Summary of the proposed regulation. The Waste Management Board proposes (i) to allow additional test methods to evaluate contamination, (ii) to set time frames in the regulations in terms of calendar days instead of working days, (iii) to require program participants to acknowledge any comments received during the public comment period and provide the Department of Environmental Quality (the agency) copies of any responses made to comments, (iv) to update documents incorporated by reference, and (v) to improve the readability of the regulation.

Estimated economic impact. The Voluntary Remediation Program encourages hazardous substance cleanups that might not otherwise take place. The program establishes procedures for voluntary owners or operators to remedy contamination at their sites. When the cleanup is satisfactorily completed, the agency issues a "certification of satisfactory completion of remediation." This certification provides an exemption from further enforcement unless new issues are discovered.

The proposed regulations expand the evaluation test methods to include "other methodologies approved by the department." This is in addition to the methods specified in the referenced documents in the regulations. The agency indicates that alternate methods that have not been incorporated by reference will not be required unless the program participant makes a request. This change is expected to increase the participant's choices in evaluating sites. According to the agency, sometimes the program participant may wish to use other methods because methods prescribed in the referenced material may not be appropriate for a specific site. In addition, analytic equipment, techniques, and methods for testing the efficacy of remediation efforts are constantly being developed. The regulatory process may not always keep up with technical advances.

In practice, the agency has been using the most recent methods. In those cases, where the referenced methods are not appropriate for a specific site, the participant will have the option to seek approval from the agency to use an alternate test method. The agency will then review the alternate test method and determine if it will be allowed. For example, the Environmental Protection Agency (EPA) may have updated test methods for evaluating solid waste and added a new test method. The participant may wish to use the new approved test method at their site and may request the director to approve the new test method. This proposed change allows the program participant to use more appropriate methods. The agency expects requests for about two cases per year to employ alternate methods instead of standard methods included in the documents incorporated by reference. The use of more appropriate test methods is expected to give more accurate results. The agency does not believe there is any increase in health risks by deviating from the test methods in referenced documents. Thus, the proposed change is expected to be beneficial for the program participants and

may result in cleaner sites if more appropriate methods are employed.

The time frames in the regulation are proposed to be set in terms of calendar days instead of working days. The term, "working days," created confusion for the regulated community. The agency has received complaints concerning the ambiguity of the term "working days." The proposed changes are likely to prevent such confusions. The proposed use of calendar days instead of working days will reduce the time frame given to an applicant to contest the director's decision to deny an application to participate in the program from 30 working days to 30 calendar days. According to the agency, the new time frame is consistent with the Administrative Process Act. Nonetheless, the program participants will have less time to contest the decision on the application. Second, the proposed change will reduce time given to the program participants to request a reimbursement of their registration fee balance from 60 working days to 60 calendar days.¹ Third, the time frame for the director to expedite issuance of a permit after receiving a submittal of demonstration of completion will be reduced from 120 working days to 120 calendar days. As opposed to other two changes, this change reduces the time given to the agency instead of the participant. The director will have to take action on the complete permit application sooner. The participant may realize some time savings. The agency indicates that the proposed time changes have the potential to expedite the overall process by reducing time frames for the participant and the agency. However, available information is not sufficient to determine if these changes will produce net economic benefits for the Commonwealth.

Program participants will be required to acknowledge any comments received during the public comment period and provide the agency copies of any responses made to comments. A letter will be sent to the commenter acknowledging the comment, and a copy of that acknowledgement will be forwarded to the agency. This proposed change will make sure that the commenters are being acknowledged, and the agency is aware of the correspondence between the participant and the commenter, if any takes place. The agency indicated that the number of comments received is not many. Commenters are likely to benefit from knowing that their concerns reached the participant. The agency is also likely to benefit from being notified what the concerns are. The program participant, however, is likely to incur small costs to respond to both the commenter and the agency. However small the costs may be, it is unclear what the net economic impact would be.

The proposed amendments update documents incorporated by reference. Certain scientific documents are incorporated by reference to address acceptable remediation methods. These EPA documents are needed to administer the program. They provide the necessary technical information. For example, the Test Methods for Evaluating Solid Waste is used as a guidance for analytical and sampling methods, the

¹ Participants are not required to provide a cost estimate to determine registration fee at the time of application if they pay the statutory maximum. They may request outstanding balance after the actual costs incurred and the exact fee is calculated.

Soil Screening Guidance is used as a tool to standardize and accelerate evaluation and cleanup of contaminated soils, the Risk Assessment Guidance for Superfund outlines the process in risk assessment, and the Risk Based Concentration Table provides assistance in evaluating risks to human health. The proposed changes refer to the most recent version of these documents. The agency is not aware of any significant differences in referenced materials regarding the test methods. And, the agency has been using the most recent versions in practice. Thus, no significant economic impact is expected.

The other changes include changes in definitions, reorganization of the regulation, and clarifications to make it more understandable. Some participants were having problems interpreting and following the requirements prescribed because of the language in the regulations. The problems were not significant, but since the agency was amending the regulations, a decision was made to clarify and reorganize the regulations to improve readability. As a result of these changes, the proposed amendment will more clearly delineate the expectations of the department.

Businesses and entities affected. According to DEQ, 130 sites have entered the program in the last five years. Based on that information, the agency expects about 24 sites to enter the voluntary remediation program annually. Thus, the proposed changes will affect about 24 voluntary property owners per year whose sites are expected to enter the program.

Localities particularly affected. The proposed amendments apply throughout the Commonwealth.

Projected impact on employment. No significant effect on employment is expected.

Effects on the use and value of private property. Since the proposed changes allow alternate methods for the site cleanups upon request from the program participant, it is likely that the preferred method will provide benefits to the property owner. In some cases, the owner's request may be based on the desire to achieve a cleaner site with more appropriate methods in the hopes of increasing the value of the contaminated property. The value of such property may increase if a higher level of remediation is achieved.

Agency's Response to the Department of Planning and Budget's Economic Impact Analysis: The department has reviewed the economic impact analysis prepared by the Department of Planning and Budget and has no comment.

Summary:

The Voluntary Remediation Regulations encourage the remediation of properties not mandated by the Comprehensive Environmental Response, Compensation and Liability Act, 42 USC §9601 et seq. (CERCLA); the Resource Conservation and Recovery Act, 42 USC § 6901 et seq. (RCRA); the Virginia Waste Management Act (§ 10.1-1400 et seq. of the Code of Virginia); State Water Control Law (§ 62.1-44.2 et seq. of the Code of Virginia); or other applicable authority. The regulations are being amended to update documents incorporated by reference, and to clarify the regulations.

9 VAC 20-160-10. Definitions.

The following words and terms, when used in this chapter, shall have the following meanings unless the context clearly indicates otherwise.

"*Act*" means the Voluntary Remediation Act (§ 10.1-1429.1 et seq. of the Code of Virginia).

~~"Agreement" means the Voluntary Remediation Agreement entered into between the department and a Voluntary Remediation Program participant.~~

"*Authorized agent*" means any person who is authorized in writing to fulfill the requirements of this program.

~~"Baseline risk assessment" means the portion of a risk assessment which addresses the potential adverse human health and environmental effects under both current and planned future conditions caused by the presence of a contaminant in the absence of any control, remediation, or mitigation measures.~~

"*Carcinogen*" means a chemical classification for the purpose of risk assessment as an agent that is known or suspected to cause cancer in humans, including but not limited to a known or likely human carcinogen or a probable or possible human carcinogen under an EPA weight-of-evidence classification system.

"*Certificate*" means a written certification of satisfactory completion of remediation issued by the director pursuant to § 10.1-1429.1 of the Code of Virginia.

"*Completion*" means fulfillment of the commitment agreed to by the participant as part of this program.

"*Contaminant*" means any man-made or man-induced alteration of the chemical, physical or biological integrity of soils, sediments, air and surface water or groundwater including, but not limited to, such alterations caused by any hazardous substance (as defined in the Comprehensive Environmental Response, Compensation and Liability Act, 42 USC §9601(14)), hazardous waste (as defined in 9VAC 20-60-40), solid waste (as defined in 9 VAC 20-80-10), petroleum (as defined in Articles 9 (§ 62.1-44.34:8 et seq.) and 11 (§ 62.1-44.34:14 et seq.)) of the Virginia State Water Control Law, or natural gas.

"*Cost of remediation*" means all costs incurred by the participant pursuant to activities necessary for completion of voluntary remediation at the site, based on an estimate of the net present value (NPV) of the combined costs of the site investigation, report development, remedial system installation, operation and maintenance, and all other costs associated with ~~the remedial action participating in the program and addressing the contaminants of concern at the site.~~

"*Department*" means the Department of Environmental Quality of the Commonwealth of Virginia or its successor agency.

"*Director*" means the Director of the Department of Environmental Quality ~~or such other person to whom the director has delegated authority.~~

~~"Engineering controls" means remedial actions directed toward containing or controlling the migration of contaminants through the environment physical modification to a site or facility to reduce or eliminate potential for exposure to contaminants. These include, but are not limited to, stormwater conveyance systems, pump and treat systems, slurry walls, liner systems, caps, monitoring systems, and leachate collection systems and groundwater recovery systems.~~

"*Hazard index (HI)*" means the sum of more than one hazard quotient for multiple contaminants or multiple exposure pathways or both. The HI is calculated separately for chronic, subchronic, and shorter duration exposures.

"*Hazard quotient*" means the ratio of a single contaminant exposure level over a specified time period to a reference dose for that contaminant derived from a similar period.

"*Incremental upper-bound lifetime cancer risk level*" means a conservative estimate of the incremental probability of an individual developing cancer over a lifetime. Upper-bound lifetime cancer risk level is likely to overestimate "true risk."

"*Institutional controls*" means legal or contractual restrictions on property use that remain effective after remediation is completed, and are used to ~~meet remediation levels~~ reduce or eliminate the potential for exposure to contaminants. The term may include, but is not limited to, deed and water use restrictions.

"*Land use controls*" means legal or physical restrictions on the use of, or access to, a site to reduce or eliminate potential for exposure to contaminants, or prevent activities that could interfere with the effectiveness of remediation. Land use controls include but are not limited to engineering and institutional controls.

"*Noncarcinogen*" means a chemical classification for the purposes of risk assessment as an agent for which there is either inadequate ~~toxicologic~~ toxicological data or is not likely to be a carcinogen based on an EPA weight-of-evidence classification system.

"*Operator*" means the person currently responsible for the overall operations at a site, or any person responsible for operations at a site at the time of, or following, the release.

"*Owner*" means any person currently owning or holding legal or equitable title or possessory interest in a property, including the Commonwealth of Virginia, or a political subdivision thereof, including title or control of a property conveyed due to bankruptcy, foreclosure, tax delinquency, abandonment, or similar means, ~~or any person who previously owned the property.~~

"*Participant*" means a person who has received confirmation of eligibility and has remitted payment of the registration fee.

"*Person*" means an individual, corporation, partnership, association, a governmental body, a municipal corporation or any other legal entity.

"*Program*" means the Virginia Voluntary Remediation Program.

"Property" means a parcel of land defined by the boundaries in the deed.

"Reference dose" means an estimate of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime.

"Registration fee" means the fee paid to enroll in the Voluntary Remediation Program, based on 1.0% of the total cost of remediation at a site, not to exceed the statutory maximum.

"Release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing of any contaminant into the environment.

"Remediation" means actions taken to cleanup, mitigate, correct, abate, minimize, eliminate, control and contain or prevent a release of a contaminant into the environment in order to protect human health and the environment, including actions to investigate, study or assess any actual or suspected release. *Remediation may include, when appropriate and approved by the department, land use controls.*

"Remediation level" means the concentration of a contaminant ~~and with~~ applicable *land use* controls, that ~~are~~ is protective of human health and the environment.

"Report" means the Voluntary Remediation Report required by 9 VAC 20-160-70.

"Restricted use" means any use other than residential.

"Risk" means the probability that a contaminant will cause an adverse effect in exposed humans or to the environment.

"Risk assessment" means the process used to determine the risk posed by contaminants released into the environment. Elements include identification of the contaminants present in the environmental media, assessment of exposure and exposure pathways, assessment of the toxicity of the contaminants present at the site, characterization of human health risks, and characterization of the impacts or risks to the environment.

"Site" means any property or portion thereof, as agreed to and defined by the participant and the department, which contains or may contain contaminants being addressed under this program.

"Termination" means the formal discontinuation of participation in the Voluntary Remediation Program *without obtaining a certification of satisfactory completion.*

"Unrestricted use" means the designation of acceptable future use for a site at which the remediation levels, based on either background or standard residential exposure factors, have been attained throughout the site in all media.

~~"Upper bound lifetime cancer risk level" means a conservative estimate of the probability of one excess cancer occurrence in a given number of exposed individuals. For example, a risk level of 1×10^{-6} equates to one additional cancer occurrence in one million exposed individuals, beyond the number of~~

~~occurrences that would otherwise occur. Similarly, a risk level of 1×10^{-4} equates to one additional cancer occurrence in 10,000 exposed individuals. Upper bound lifetime cancer risk level is based on an assumption of continuous, lifetime exposure and is likely to overestimate "true risk."~~

9 VAC 20-160-20. Purpose, applicability, and compliance with other regulations.

A. The purpose of this chapter is to establish standards and procedures pertaining to the eligibility, enrollment, reporting, remediation, and termination criteria for the Virginia Voluntary Remediation Program (~~VRRP~~) in order to protect human health and the environment.

B. This chapter shall apply to all persons who elect to and are eligible to participate in the Virginia Voluntary Remediation Program.

C. Participation in the program does not relieve a participant from the obligation to comply with all applicable federal, state and local laws, ordinances and regulations related to the ~~conduct of investigation and remedial activities~~ *remediation* (e.g., waste management and disposal, erosion and sedimentation controls, air emission controls, and activities that impact wetlands and other sensitive ecological habitats) undertaken by the participant pursuant to this chapter.

9 VAC 20-160-30. Eligibility criteria.

A. Candidate sites shall meet eligibility criteria as defined in this section.

B. Any persons who own, operate, have a security interest in or enter into a contract for the purchase or use of an eligible site who wish to voluntarily remediate that site may participate in the program. Any person who is an authorized agent of any of the parties identified in this subsection may participate in the program.

C. Sites are eligible for participation in the program if (i) remediation has not been clearly mandated by the United States Environmental Protection Agency, the department or a court pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (42 USC § 9601 et seq.), the Resource Conservation and Recovery Act (42 USC § 6901 et seq.), the Virginia Waste Management Act (§ ~~40.1-400~~ 10.1-1400 et seq. of the Code of Virginia), the Virginia State Water Control Law (§ 2.1-4.2 et seq. of the Code of Virginia), or other applicable statutory or common law; or (ii) jurisdiction of the statutes listed in clause (i) has been waived.

A site on which an eligible party has completed remediation of a release is potentially eligible for the program if the actions can be documented in a way which are equivalent to the requirements for prospective remediation, and provided ~~they can meet~~ *the site meets* applicable remediation levels.

Petroleum or oil releases not mandated for remediation under Articles 9 (§ 62.1-44.34:8 et seq.) and 11 (§ 62.1-44.34:14 et seq.) of the Virginia State Water Control Law may be eligible for participation in the program.

Where an applicant raises a genuine issue based on documented evidence as to the applicability of regulatory

programs in subsection D of this section, the site may be eligible for the program. Such evidence may include a demonstration that:

1. It is not clear whether the release involved a waste material or a virgin material;
2. It is not clear that the release occurred after the relevant regulations became effective; or
3. It is not clear that the release occurred at a regulated unit.

D. For the purposes of this chapter, remediation has been clearly mandated if any of the following conditions exist, unless jurisdiction for such mandate has been waived:

1. Remediation of the release is the subject of a permit issued by the U.S. Environmental Protection Agency or the department, a pending or existing closure plan, a pending or existing administrative order, a pending or existing court order, a pending or existing consent order, or the site is on the National Priorities List;
2. The site at which the release occurred, ~~in accordance with~~ *is subject to* the Virginia Hazardous Waste Management Regulations (9 VAC 20-60-10 ~~et seq.~~) (VHWMR), is a permitted facility, is applying for or should have applied for a permit, is under interim status or should have applied for interim status, or was previously under interim status, and is thereby subject to requirements of the VHWMR;
3. The site at which the release occurred constitutes an open dump or unpermitted solid waste management facility under Part IV (9 VAC 20-80-170 et seq.) of the Virginia Solid Waste Management Regulations;
4. The director determines that the release poses an imminent and substantial threat to human health or the environment; or
5. Remediation of the release is otherwise the subject of a response action required by local, state, or federal law or regulation.

E. The director may determine that a site under subdivision D 3 of this section may participate in the *VRP program* provided that such participation complies with the substantive requirements of the applicable regulations.

9 VAC 20-160-40. Application for participation.

A. The application for participation in the Voluntary Remediation Program shall, at a minimum, provide the elements listed below.:

1. A *written* notice of intent to participate in the program;
2. A statement of the applicant's eligibility to participate in the program (e.g., proof of ownership, security interest, etc.).
3. For authorized agents, a letter of authorization from an eligible party;
4. A legal description of the site;
5. The general operational history of the site;

6. A general description of information known to or ascertainable by the applicant pertaining to (i) the nature and extent of any contamination; and (ii) past or present releases, both at the site and immediately contiguous to the site.;

7. A discussion of the potential jurisdiction of other existing environmental regulatory programs, or documentation of a waiver thereof; and

8. A *notarized* certification by the applicant that to the best of his knowledge, ~~that~~ all the information as set forth in this subsection is true and accurate.

B. Within ~~45 working~~ *60* days of the department's receipt of an application, the director ~~will~~ *shall* review the application to verify that (i) the application is complete and (ii) the applicant and the site meet the eligibility criteria set forth in 9VAC 20-160-30.

C. If the director makes a tentative decision to reject the application, ~~then~~ he shall notify the applicant in writing that the application has been tentatively rejected and provide an explanation of the reasons for the proposed rejection. Within ~~30 working~~ days of the applicant's receipt of notice of rejection the applicant may (i) submit additional information to correct the inadequacies of the rejected application or (ii) accept the rejection. The director's tentative decision to reject an application will become a final agency action under the Virginia Administrative Process Act (§ ~~9-6-14-4~~ *2.2-4000* et seq. of the Code of Virginia) upon receipt of an applicant's written acceptance of the director's decision to reject an application, or in the event an applicant fails to respond within ~~30 working~~ days specified in this subsection, upon expiration of the ~~30 working~~ days specified. If within ~~30 working~~ days ~~specified~~ an applicant submits additional information to correct the inadequacies of an application, the review process begins again in accordance with this section.

9 VAC 20-160-50. Agreement. (Repealed.)

~~Within 90 working days of June 26, 1997, persons conducting remediation pursuant to a voluntary remediation agreement with the department entered into prior to the promulgation of these regulations shall notify the department in writing as to whether they wish to complete the remediation in accordance with such an agreement or in accordance with these regulations. If the participant elects to complete the voluntary remediation in accordance with this chapter, such election will result in termination of the agreement. If the participant does not notify the department of his election within 90 working days of June 26, 1997, remediation shall be completed in accordance with this chapter, and the existing agreement shall be terminated.~~

9 VAC 20-160-60. Registration fee.

A. In accordance with §10.1-1429.1 A 5 of the Code of Virginia, the applicant shall submit a registration fee to defray the cost of the ~~voluntary remediation~~ program.

B. The registration fee ~~will~~ *shall* be at least 1.0% of the estimated cost of the remediation at the site, not to exceed the statutory maximum. Payment ~~will~~ *shall* be required after eligibility has been verified by the department and prior to technical review of submittals pursuant to 9 VAC 20-160-80.

Payment shall be made payable to the Commonwealth of Virginia and remitted to Virginia Department of Environmental Quality, P.O. Box 10150, Richmond, VA 23240.

C. To determine the appropriate registration fee, the applicant may provide ~~a remediation cost~~ an estimate of the total anticipated ~~total cost based upon net present value of~~ remediation ~~at the site.~~

~~Remediation costs shall be based on site investigation activities; report development; remedial system installation, operation and maintenance; and all other costs associated with participating in the program and addressing the contaminants of concern at the subject site.~~

Departmental concurrence with ~~a~~ *an estimate of the cost of remediation cost estimate* does not constitute approval of the remedial approach assumed in the cost estimate.

The participant may elect to remit the statutory maximum registration fee to the department as an alternative to providing an estimate of the total cost of remediation at the time of eligibility verification.

D. ~~Upon submittal of the demonstration of completion (see 9 VAC 20-160-70 A-2) If the participant does not elect to submit the statutory maximum registration fee, the participant will shall provide the department with the actual total cost of the remediation, and prior to issuance of a certificate. The director will department shall calculate any balance adjustments to be made to the initial registration fee. Any negative balance owed to the department shall be paid by the participant prior to the issuance of a certification of satisfactory completion of remediation certificate. Any costs to be refunded shall be remitted by the agency department with issuance of the certificate of satisfactory completion of remediation.~~

E. ~~As an alternative to providing a remedial cost estimate at the time of eligibility verification, If the participant may elect elected to remit the statutory maximum registration fee, the department will shall refund any balance owed to the participant after receiving the actual total cost of remediation submitted with the demonstration of completion and issuance of the certification of satisfactory completion of remediation. If no remedial cost summary is provided to the department within 60 working days of the participant's receipt of the department's concurrence with the demonstration of completion certificate, the participant will have waived the right to a refund.~~

9 VAC 20-160-70. Work to be performed.

A. The Voluntary Remediation Report serves as the ~~master document~~ *archive* for all documentation pertaining to remedial activities at the site. Each component of the report shall be submitted by the participant to the department. As various components are received, they shall be inserted into ~~this the~~ report by the participant, ~~and the report will serve as the documentation archive for the site. # The report shall consist of a site characterization/, risk assessment (as appropriate), remedial action work plan and, when applicable, a demonstration of completion, and documentation of public notice.~~

~~1. Site characterization/remedial action plan. This component of the report shall consist of the following:~~

~~a. 1. The site characterization component of the submittal should shall contain a delineation of the nature and extent of releases to all media, including the vertical and horizontal extent of the contaminants.~~

~~2. The risk assessment shall contain an evaluation of the risks to human health and the environment posed by the release, a proposed set of remediation levels consistent with 9 VAC 20-160-90 that are protective of human health and the environment, and a recommended remedial action remediation to achieve the proposed objectives; or a justification demonstration that no action is necessary.~~

~~b. 3. The remedial action work plan component of the submittal shall propose the activities, schedule, any permits required to initiate and complete the remedial action remediation and specific design plans for implementing a remedial action remediation that will achieve the remediation levels specified in the site characterization risk assessment. Control or elimination of continuing onsite source or sources of releases to the environment shall be discussed. Land use controls should be discussed as appropriate.~~

~~c. Documentation of the public notice in accordance with 9 VAC 20-160-120. Such documentation shall include a written summary of comments received as well as the applicant's responses to the comments that were received during the public comment period.~~

~~2. 4. Demonstration of completion.~~

~~a. This closure component of The report demonstration of completion should, when applicable, include a detailed summary of the performance of the remedial action remediation implemented at the site, the total cost of the remediation, and, as necessary, confirmational sampling results demonstrating that the established site-specific remedial objectives have been achieved, or that other criteria for completion of remediation have been satisfied. If the participant elected to remit the statutory maximum registration fee and is not seeking a refund of any portion of the registration fee, the total cost of remediation need not be provided.~~

~~b. As part of the demonstration of completion, the participant shall certify compliance with applicable regulations pertaining to activities performed at the site pursuant to this chapter.~~

~~5. The participant shall provide documentation that public notice has been provided in accordance with 9 VAC 20-160-120. Such documentation shall include copies of comments received during the public comment period, all acknowledgements of receipt of comments, as well as the participant's responses to comments, if any are made.~~

B. It is the participant's responsibility to ensure that the ~~conduct~~ of investigation and remediation activities (e.g., waste management and disposal, erosion and sedimentation controls, air emission controls, and activities that impact wetlands and other sensitive ecological habitats) comply with all applicable regulations and any appropriate regulations that

are not required by state or federal law but are necessary to ensure that the activities do not result in a further release of contaminants to the environment and are protective of human health and the environment.

C. All work shall be performed in accordance with Test Methods for Evaluating Solid Waste, USEPA SW-846, revised ~~December 1987~~ April 1998, or other methods approved by the department.

9 VAC 20-160-80. Review of submittals.

A. Upon receipt of submittals, the ~~director will~~ department shall review and evaluate the submittals. The ~~director~~ department may request additional information in order to render a decision and move the participant towards expeditious issuance of the ~~certification of satisfactory completion of remediation certificate~~.

B. The director may expedite, as appropriate, issuance of any permits required to initiate and complete a voluntary remediation. The director shall, within 120 working days of a complete submittal, expedite issuance of such permit in accordance with applicable regulations.

C. ~~The participant shall submit a final voluntary remediation report (consisting of the site characterization, the remedial action work plan, and the demonstration of completion). Upon receipt of~~ After receiving a complete Voluntary Remediation report, the director ~~will~~ shall make a determination regarding the issuance of the ~~certification of satisfactory completion of remediation certificate~~ to the participant. The determination shall be a final agency action pursuant to the Administrative Process Act (§ ~~9-6.44:4 2.2-4000~~ et seq. of the Code of Virginia).

9 VAC 20-160-90. Remediation levels.

A. The participant, with the concurrence of the department, shall consider impacts to human health and the environment in establishing remediation levels.

B. Remediation levels shall be based upon a risk assessment of the site and surrounding areas that may be impacted, reflecting the current and future use scenarios.

1. A site shall be deemed to have met the requirements for unrestricted use if the remediation levels, based on either background or standard residential exposure factors, have been attained throughout the site and in all media. Attainment of these levels will allow the site to be given an unrestricted use classification. No remediation techniques or *land use* controls which that require ongoing management (~~such as institutional or engineering controls~~) may be employed to achieve this classification.

2. For sites that do not achieve the unrestricted use classification, ~~restrictions on site~~ *land use controls* shall be applied. ~~Restrictions shall include, but not be limited to, institutional and engineering controls.~~ The restrictions imposed upon a site ~~will~~ may be media-specific and, may vary according to site-specific conditions, ~~and may be applied to limit present and future use with restrictions may range from residential to industrial.~~ All ~~restrictions on use controls~~ necessary to attain ~~this standard~~ the restricted use classification shall be described in the ~~certification of~~

~~satisfactory completion of remediation certificate~~ as provided in 9 VAC 20-160-110. *Land use controls approved by the department for use at the site are considered remediation.*

C. Remediation levels shall be developed after appropriate site characterization data have been gathered as provided in 9 VAC 20-160-70. Remediation levels may be derived from the three-tiered approach provided in ~~subdivision 2~~ of this subsection. Any tier or combination of tiers may be applied to establish remediation levels for contaminants present at a given site, with consideration of site use restrictions specified in subsection B of this section. ~~The criteria set forth in subdivision 1 of this subsection shall apply to the risk-based remediation levels determined through Tiers II and III.~~

1. ~~General criteria.~~

a. ~~For a site with carcinogenic contaminants, the remediation goal for individual carcinogenic contaminants shall be an incremental upper-bound lifetime cancer risk of 1×10^{-6} . The remediation levels for the site shall not result in an incremental upper-bound lifetime cancer risk exceeding 1×10^{-4} considering multiple contaminants and multiple exposure pathways, unless the use of a Maximum Contaminant Level (MCL) for groundwater that has been promulgated under 42 USC §300g-1 of the Safe Drinking Water Act and the National Primary Drinking Water Regulations (40 CFR Part 141) results in a cumulative risk greater than 1×10^{-4} .~~

b. ~~For noncarcinogens, the hazard index shall not exceed a combined value of 1.0.~~

c. ~~For unrestricted future use, where a contaminant of concern has an MCL, the MCL for that contaminant shall be the remediation level.~~

d. ~~For unrestricted future use, where a contaminant of concern exists for which surface water quality standards (WQS) have been adopted by the State Water Control Board for a specific use, the participant shall demonstrate that concentrations in other media will not result in concentrations that exceed the WQS in adjacent surface water bodies.~~

e. ~~If the concentration for a contaminant is below the Practical Quantitation Limit (PQL), generally as published in Test Methods for Evaluating Solid Waste, USEPA SW-846, revised December 1987, the PQL may be considered as the remediation level.~~

f. ~~In setting remediation levels, the department may consider risk assessment methodologies approved by another regulatory agency and current at the time of the VRP site characterization.~~

2. ~~Tier-based criteria.~~

a. 1. Under Tier I the participant shall collect appropriate samples from background and from the area of contamination for all media of concern.

(4) a. Background levels shall be determined from a portion of the property or a nearby property that has not been impacted by the contaminants of concern.

~~(2) b.~~ The participant shall compare concentrations from the area of contamination against background concentrations. If the concentrations from the area of contamination exceed established background levels, the participant may consider Tier II or Tier III methodologies, as applicable. *If concentrations are at or below background levels, no further assessment is necessary.*

~~b.~~ 2. Tier II generic remediation levels are ~~based on published, media-specific values, derived using conservative unrestricted use default assumptions. If the remediation level determined using Tier II is below the PQL, the PQL may be used.~~ Use of Tier II shall be limited to the following:

a. Tier II generic groundwater remediation levels shall be based on (i) federal Maximum Contaminant Levels (MCLs) or action levels for lead and copper as established by the Safe Drinking Water Act (42 USC § 300 (f)) and the National Primary Drinking Water Regulations (40 CFR Part 141) or, in the absence of a MCL, (ii) tap water values provided in the EPA Region III Risk-Based Concentration Table current at the time of the assessment. For contaminants that do not have values available under clauses (i) or (ii) above, a remediation level shall be calculated using criteria set forth under Tier III remediation levels.

~~(4) b.~~ Soil remediation levels shall insure that migration of contaminants shall not cause the cleanup levels established for groundwater and surface water to be exceeded. Soil remediation levels shall be determined as the lower of either the ingestion or cross-media transfer values, according to the following:

~~(a)~~ (1) For ingestion, values provided in the EPA Region III Risk-Based Concentration Table current at the time of assessment.

~~i.~~ (a) For carcinogens, the soil ingestion concentration for each contaminant, reflecting an individual upper-bound lifetime cancer risk of 1×10^{-6} .

~~ii.~~ (b) For noncarcinogens, 1/10 (i.e., Hazard Quotient = 0.1) of the soil ingestion concentration, to account for multiple systemic toxicants at the site. For sites where there are fewer than 10 contaminants exceeding 1/10 of the soil ingestion concentration, the soil ingestion concentration may be divided by the number of contaminants such that the resulting hazard index does not exceed one.

~~(b)~~ (2) For cross-media transfer, values derived from the USEPA Soil Screening Guidance (OSWER, April July 1996, Document 9355.4-23, ~~PB 96-963505~~, EPA/540/R-96/018) shall be used as follows:

~~i.~~ (a) The soil screening level for transfer to groundwater, with adjustment to a hazard quotient of 0.1 for noncarcinogens, if the value is not based on ~~a~~ a MCL; or

~~ii.~~ (b) The soil screening level for transfer to air, with adjustment to a hazard quotient of 0.1 for

noncarcinogens, using default residential exposure assumptions.

~~iii.~~ (3) For noncarcinogens, for sites where there are fewer than 10 contaminants exceeding 1/10 of the soil screening level, the soil screening level may be divided by the number of contaminants such that the resulting hazard index does not exceed one.

~~(c)~~ (4) Values derived under 9VAC 20-160-90 C 2 b (1) ~~(a)~~ and ~~(b)~~ (2) may be adjusted to allow for updates in approved toxicity factors as necessary.

~~(2) Tier II generic groundwater remediation levels shall be based on (i) federal MCLs or action levels for lead and copper as established by the Safe Drinking Water Act (42 USC § 300 (f)) and the National Primary Drinking Water Regulations (40 CFR Part 141) or (ii) tap water ingestion values provided in the EPA Region III Risk-Based Concentration Table current at the time of the assessment.~~

~~(3) For contaminants that do not have values available under clauses (i) or (ii) in 9 VAC 20-160-90 C 2 b (2), a remediation level shall be calculated using criteria set forth under Tier III.~~

~~(4) c.~~ At sites where ecological receptors are of concern and there are complete exposure pathways, the participant shall perform a screening level ecological evaluation to show that remediation levels developed under Tier II are also protective of ecological receptors of concern.

d. For unrestricted future use, where a contaminant of concern exists for which surface water quality standards (WQS) have been adopted by the State Water Control Board for a specific use, the participant shall demonstrate that concentrations in other media will not result in concentrations that exceed the WQS in adjacent surface water bodies.

~~e.~~ 3. Tier III remediation levels are based upon a site-specific risk assessment considering site-specific assumptions about current and potential exposure scenarios for the ~~population(s) population or populations~~ of concern, including ecological receptors, and characteristics of the affected media.

~~(4) a.~~ In developing Tier III remediation levels, *and unless the participant proposes other guidance that is acceptable to the department*, the participant shall ~~consider use~~, for all applicable media and exposure routes, the methodology specified in Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), Interim Final, USEPA, December 1989 (EPA/540/1-89/002) and (Part B, Development of Preliminary Remediation Goals) Interim, USEPA, December 1991 (Publication 9285.7-01B) with modifications as appropriate to allow for site-specific conditions. The participant may ~~consider other guidance that is current at the time of the assessment and is acceptable to use other methodologies approved by the department.~~

b. For a site with carcinogenic contaminants, the remediation goal for individual carcinogenic contaminants shall be an incremental upper-bound lifetime cancer risk of 1×10^{-6} . The remediation levels for the site shall not result in an incremental upper-bound lifetime cancer risk exceeding 1×10^{-4} considering multiple contaminants and multiple exposure pathways, unless the use of a MCL for groundwater that has been promulgated under 42 USC § 300g-1 of the Safe Drinking Water Act and the National Primary Drinking Water Regulations (40 CFR Part 141) results in a cumulative risk greater than 1×10^{-4} .

c. For noncarcinogens, the hazard index shall not exceed a combined value of 1.0.

d. In setting remediation levels, the department may consider risk assessment methodologies approved by another regulatory agency and current at the time of the Voluntary Remediation Program site characterization.

e. Groundwater cleanup levels shall be based on the most beneficial use of the groundwater. The most beneficial use of the groundwater is for a potable water source, unless demonstrated otherwise by the participant and approved by the department.

~~(2)~~ f. For sites where a screening level ecological evaluation has shown that there is a potential for ecological risks, the participant shall perform an ecological risk assessment to show that remediation levels developed under Tier III are also protective of ecological receptors of concern. If the Tier III remediation levels developed for human health are not protective of ecological receptors of concern, the remediation levels shall be adjusted accordingly.

9 VAC 20-160-100. Termination.

A. Participation in the program shall ~~conclude~~ be terminated:

~~1. When the director concurs with all work submitted, as set forth in 9 VAC 20-160-80, and the participant satisfactorily demonstrates attainment of the remediation levels. If warranted by the site-specific risk assessment, it may not be necessary to conduct remedial action in order to attain remediation levels.~~

2. 1. When evaluation of new information obtained during participation in the program results in a determination by the director that the site is ineligible or that a participant has taken an action to render the site ineligible for participation in the program. If such a determination is made, the director shall notify the participant that participation has been terminated and provide an explanation of the reasons for the determination. Within 30 working days, the participant may submit additional information, or accept the director's determination.

~~3.~~ 2. Upon 30 working days written notice of termination by either party.

B. The department shall be entitled to receive and use, upon request, copies of any and all information developed by or on behalf of the participant as a result of work performed pursuant to participation in the program, after application has

been made to the program whether the program is satisfactorily completed or terminated.

~~C. Termination of participation in the program by any method, except as provided in subdivision A 1 of this section, shall result in no refund of any registration fee submitted. No portion of the registration fee will be refunded if participation is terminated by any method as described in 9 VAC 20-160-100.~~

9 VAC 20-160-110. Certification of satisfactory completion of remediation.

~~A. Upon termination of program participation according to 9 VAC 20-160-100 A 1,~~ The director shall issue a certification of satisfactory completion of remediation ~~(certificate)~~, when:

1. The participant has demonstrated that migration of contamination has been stabilized;
2. The participant has demonstrated that the site has met remediation levels and will continue to meet remediation levels in the future; and
3. The department concurs with all work submitted, as set forth in 9 VAC 20-160-80.

B. The issuance of the certificate shall constitute immunity to an enforcement action under the Virginia Waste Management Act (§ 10.1-1400 et seq. of the Code of Virginia), the Virginia State Water Control Law (§ 62.1-44.2 et seq. of the Code of Virginia), the Virginia Air Pollution Control Law (§ 10.1-1300 et seq. of the Code of Virginia), or other applicable Virginia law.

~~C. The certificate shall be issued by the director and,~~ If a use restriction is specified in the certificate, such restriction must be attached to the deed and include to the property with an explanation for such the restriction, subject to concurrence by the director, and shall be recorded by the participant with the land records for the site in the office of the clerk of the circuit court for the jurisdiction in which the site is located. The participant may also record the certificate itself. If the certificate does not include any use restriction, recordation of the certificate is at the option of the participant. The immunity accorded by the certification shall apply to the participant and shall run with the land identified as the site.

~~D. The immunity granted by issuance of the certificate shall be limited to site conditions at the time of issuance as those conditions are described in the Voluntary Remediation Report and is conditioned upon completeness and accuracy of that information. The immunity is further conditioned upon satisfactory performance by the participant of all obligations required by the director under the program and upon the veracity, accuracy, and completeness of the information submitted to the director by the participant relating to the site. Specific limitations of the certificate shall be enumerated in the certificate. The immunity granted by the certificate will shall be dependent upon the identification of the nature and extent of contamination as presented in the Voluntary Remediation report.~~

E. The certificate shall specify the site conditions for which immunity is being accorded, including, but not limited to:

1. A summary of the information that was considered;

2. Any restrictions on future use;
3. Any local land use controls on surrounding properties that were taken into account; and
- ~~3.~~ 4. Any required ~~institutional~~ land use controls; and including:
 - ~~4.~~ Any required a. Engineering controls and their maintenance; and
 - b. Institutional controls.

F. The certificate may be revoked by the director at any time in the event that ~~contamination posing an unacceptable conditions at the site, unknown at the time of issuance of the certificate, pose a risk to human health or the environment is rediscovered on site~~ or in the event that ~~it is discovered that~~ the certificate was based on information ~~provided by the participant~~ that was materially false, inaccurate, or misleading. Any and all claims may be pursued by the Commonwealth for liability for failure to meet a requirement of the program, criminal liability, or liability arising from future activities at the site that may cause contamination by pollutants. By issuance of the certificate the ~~department~~ director does not waive sovereign immunity.

G. The certificate is not and shall not be interpreted to be a permit or a modification of an existing permit or administrative order issued pursuant to state law, nor shall it in any way relieve the participant of its obligation to comply with any other federal or state law, regulation or administrative order. Any new permit or administrative order, or modification of an existing permit or administrative order, must be accomplished in accordance with applicable federal and state laws and regulations.

9 VAC 20-160-120. Public participation notice.

A. Any ~~The participant shall give public notice of either the proposed voluntary remediation or the completed voluntary remediation shall be given public notice paid for by the applicant. The notice shall be made after the department concurs with the site characterization report and the proposed remediation, and shall occur prior to the department's issuing a certificate. Such notice shall be paid for by the participant.~~

~~Prior to the director's concurrence with a proposed or completed remedial action pursuant to 9 VAC 20-160-70,~~

The participant shall:

1. Provide written notice to the local government in which the facility is located a description of the proposed or completed remedial action;
2. Provide written notice to all adjacent property owners a description of the proposed or completed remedial action; and
3. Publish a notice once in a newspaper of general circulation in the area affected by the voluntary action. Such publication shall be paid for by the applicant.

B. A comment period of at least 30 days must follow issuance of the notices pursuant to this section. The contents of ~~the~~ each public notice of a voluntary remediation required pursuant to 9 VAC 20-160-120 A shall include:

1. The name and address of the ~~applicant~~ participant and the location of the proposed voluntary remediation;
2. A brief description of the ~~proposed~~ remediation, the general nature of the release, and any proposed land use controls;
3. The address and telephone number of a specific person familiar with the ~~proposed~~ remediation from whom information regarding the ~~proposed~~ voluntary remediation may be obtained; and
4. A brief description of how to submit comments.

C. The participant shall provide to the department a signed statement that he has sent a written notice to all adjacent property owners and the local government, a copy of the notice, and a list of all names and addresses to whom the notice was sent.

D. The participant shall send all commenters a letter acknowledging receipt of comments.

~~D.~~ E. The participant shall provide to the department copies of all written comments received during the public comment period, copies of acknowledgement letters, a discussion of how those comments were considered, a copy of any response to comments, and a discussion of their impact on the proposed or completed remedial action remediation.

9 VAC 20-160-130. Regulatory evaluation. (Repealed.)

~~A. Within three years after June 26, 1997, the department shall perform analysis on this chapter and provide the Waste Management Board with a report on the results. The analysis shall include:~~

- ~~1. The purpose and need for the chapter;~~
- ~~2. Alternatives which would achieve the stated purpose of this chapter in a less burdensome and intrusive manner;~~
- ~~3. An assessment of the effectiveness of this chapter;~~
- ~~4. The results of a regulatory review of current state and federal statutory and regulatory requirements, including identification and justification of this chapter's requirements which exceed federal requirements; and~~
- ~~5. The results of a review as to whether this chapter is clearly written and easily understandable by affected parties.~~

~~B. Upon review of the department's analysis, the Waste Management Board shall confirm the need to (i) continue this chapter without amendment; (ii) repeal this chapter; or (iii) amend this chapter.~~

~~C. The Waste Management Board will authorize the department to initiate the applicable regulatory process, and to carry out the decision of the Waste Management Board, if amendment or repeal of this chapter is warranted.~~

DOCUMENTS INCORPORATED BY REFERENCE

Test Methods for Evaluating Solid Waste: Physical/ Chemical Methods; EPA Publication SW-846, Third Edition (1986) with Revision I as amended by Final Update I, Final Update II, Final Update IIA, Final Update IIB, Final Update III, and Final

Update IIIA, PB ~~88-239223~~ 99-115 891, revised ~~December 1987~~ April 1998.

U.S. EPA Soil Screening Guidance, EPA/540/F-95/044 EPA/540/R-96/018, Publication ~~93554-14FSA, PB96-963504~~ 9355.4-23, July 1996.

Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A) Interim Final, EPA/540/1-89/002, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, December 1989.

Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals) Interim, Publication 9285.7-01B, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, December 1991.

Risk-Based Concentration Table, Region III, United States Environmental Protection Agency, ~~January-June 1996~~ October 5, 2000.

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